

ART. XVIII. DESCRIPTION OF *PLETHODON RICHMONDI*,
A NEW SALAMANDER FROM WEST VIRGINIA AND OHIO

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(PLATE XXX)

In 1931, the senior author collected a series of salamanders at Oglebay Park, near Wheeling, West Virginia, which appeared to be unusually attenuated examples of the dark phase of *Plethodon cinereus*. Since this occurred shortly after the initiation of a collecting program in West Virginia and at a time when there were no large or well-rounded state collections in existence, the specimens were put aside to await the collection of additional material. It must be confessed that as more specimens accumulated the senior author continued to regard them as aberrant *cinereus*, and even postulated a genetic relation between color of back and size in West Virginia specimens. Various collaborators in the state were notified of this situation and the specimens received from them thereafter led to the conclusion that some of the dark-backed specimens represented a remarkable new species of the genus *Plethodon*.

Correspondence between the present authors during September 1938, accidentally disclosed the fact that the junior author had independently reached a similar conclusion in regard to certain Ohio specimens. The present collaboration is the happy and natural outcome.

It is especially gratifying to the senior author that, after a number of years devoted to the study of West Virginia herpetology, he is able to participate in the description of the first herpetological novelty ever described from that interesting state. He is also grateful that the junior author has shared in this sentiment by agreeing both to the selection of a specimen from West Virginia as the holotype, and to the dedication of the species to a collector, Mr. Neil D. Richmond, who has done much to increase our knowledge of the herpetofauna of his state.

¹Contribution from the Department of Zoology, Ohio University, Athens, Ohio.

***Plethodon richmondi* sp. nov.**

Plate XXX, figure 1.

Diagnosis: A very elongate *Plethodon* with small legs; costal grooves 20-23, usually 21-22; vomerine teeth 3-9 in row, usually 5-7; vomerines extending to, or beyond, the outer edge of the internal nares; dorsum in life without any trace of a light dorsal band, usually with minute greenish-gold flecks, which disappear in preserved specimens, or remain faintly visible as minute white flecks; venter dark, with small irregular white dots.

Type locality: Huntington, Cabell County, West Virginia.

Range: From Everett, Bedford County, and Pittsburgh, Allegheny County, Pennsylvania; south to Dorcas, Grant County, and Wayne, Wayne County, West Virginia; southeastern Ohio generally, at least as far westward as Cincinnati, Hamilton County, Ohio.

Description of Holotype: Carnegie Museum no. 14189, adult male, collected in Ritter Park, Huntington, Cabell County, West Virginia, at an altitude of 600-700 feet, on October 15, 1938, by Neil D. Richmond and N. Bayard Green; 21 costal grooves; 9 intercostal spaces between appressed toes; head width 9.09 in length from snout to vent; head length 5 in length from snout to vent; eye slightly longer than its distance from its anterior angle to nostril; snout swollen; a small tubercle at lower end of naso-labial groove; outline of upper jaw concave as seen from side; angle of jaw back of hind angle of eye; both eyelids fitting under a fold of skin behind; a groove from eye to gular fold; a groove from this down behind angle of jaw; limbs weak; fingers 3, 2, 4, 1, in order of length, considerably webbed at base; first finger very short, entirely in web; toes 3, 4, 2, 5, 1, in order of length, webbed to second joint, first toe entirely in web; vent papillate; tail slightly longer than head and body, round at base and throughout its length, except the tip, which is slightly compressed laterally; vomerine teeth 5-5 in series, beginning behind outer border of nares, the two rows separated in mid-line by a distance slightly greater than the width of naris, and from the parasphenoids by two times the width of naris; parasphenoids in two patches, beginning at middle of eye sockets; black above, with very minute greenish-gold flecks in life; venter dark slaty gray, with scattered white dots, which are most numerous ventrolaterally; gular region lighter; under surface of tail uniform slaty gray; total length 102 mm., length of head 10, width of head 5.5, body 40, tail 52.

Description of Allotype: Ohio University Zoology no. 632, adult female, collected in Alexander Township, Athens County, Ohio, at an altitude of 800 feet, on October 30, 1938, by H. T. Gier, differs from the holotype as follows: 22 costal grooves; 11 intercostal spaces be-

tween appressed toes; head width 9.5 in length from snout to vent; head length 5.1 in length from snout to vent; eye slightly shorter than its distance from its anterior angle to nostril; snout not swollen; no tubercle at lower end of naso-labial groove; vomerine teeth 5-5; lining of vent grooved vertically, not papillate; tail slightly shorter than head and body; total length 111 mm., length of head 11, width of head 6, body 46, tail 54.

Description of Juvenile: Carnegie Museum no. 14212, same data as holotype, has 4 intercostal spaces between appressed toes; total length 23 mm., length of head 4, head width 2.5, body 11, tail 8.

Coloration: A freshly killed specimen, Ohio University Zool. no. 631, same data as allotype, has dorsal surface of body and tail finely maculated with white and underlain by a piceous band which extends from the snout to a point directly over the cloaca (in preserved specimens, this becomes a dark chocolate brown, which is much more visible than in the living animal). The band is interrupted in the interocular region by a dark grayish blue patch. Ventral surface of body lighter than dorsum, with this lighter hue extending onto the lateral areas; it is separated from the dorsal coloration by a narrow, indefinite band of dark grayish blue. Entire ventral surface of body and tail finely maculated, the gular region more so than the rest of the body. Ventral surface of tail darker, and less maculated than ventral surface of body, with coloration comparable to that of dorsum.

An alcoholic specimen, O. U. Zool. no. 342, Athens, Ohio, has dorsal maculation barely visible, the dorsal band a dark chocolate brown, bordered on either side by a darker band, which separates it from the ventral coloration. Occasionally, in alcoholic specimens, the entire dorsal surface is a uniform dark grayish blue.

Paratypes: Localities and allocation in respective collections.

OHIO

Athens Co., Athens—O. U. Zool. nos. A341-42, A344-45, A347-48, A350

1 mi. SE of Athens—O. U. Zool. nos. A6, A289-94

1 mi. SW of Athens—O. U. Zool. no. A1

Alexander Twp.—O. U. Zool. nos. A2, A631

Lodi Twp., sec. 30—O. U. Zool. nos. A278-84

Hamilton Co., Cincinnati, Eden Park—Cincinnati Soc. Nat. Hist. no. 1270 (21 specimens)

Jackson Co., Jackson Twp.—O. U. Zool. nos. A356-58

Lawrence Co., S of Crown City—CM nos. 14102-04

Meigs Co., Bedford Twp.—O. U. Zool. nos. A3-5

WEST VIRGINIA

- Cabell Co., Huntington—CM nos. 14182-88, 14190-215, 14271-81
2 mi. S of Huntington, Pleasant Valley—CM nos. 14258
(43), 14264 (11), 14265-68
- Lewis Co., Jane Lew—CM nos. 7515, 9773
near Weston—CM no. 6097
- Marion Co., Ida May—CM no. 14072
1 mi. W of Fairmont—CM no. 14136
no locality—CM no. 5599
- Ohio Co., Oglebay Park near Wheeling—CM nos. 5278-79, 5294-
96, 5303-08, 5285 a-c and f, 5985 a-b, 5986, 8775
- Wayne Co., 3 mi. S of Wayne—CM no. 6079
7 mi. SW of Huntington—CM no. 14101
- Upshur Co., French Creek—CM no. 11256

Variation: In specimens with the highest costal groove count (23) the last complete groove is almost invariably the 21st, if the groove immediately over the foreleg is counted as the first. Either one or two forks posterior to the 21st groove may be connected with it to form a two- or three-pronged Y. If all forks are counted the total reaches 22 or 23. Counting in this fashion results in considerable variation in tabulations but it may be justified on the ground that the last complete costal groove is normally located much more anterior to the hind leg in *richmondi* than in *cinereus*. Thus the counting of all forks yields figures which reflect the greater elongation of the body observed in this salamander. This method of counting also follows the standard practice and allows ready comparison with published statistics. If the groove over the foreleg and the forks of the last complete groove are *not* counted the figure should be 19 or 20 for *richmondi*. Of 68 specimens in the Carnegie Museum collection, 7 have 20 costal grooves, 39 have 21, 18 have 22, and 4 have 23 by the maximum count. For this series the average is 21.28.

The highest intercostal count (12) invariably occurs in fully adult specimens, and conversely, the lowest count (4) occurs in juveniles. This indicates that the body length increases at a ratio greater than the growth rate of the limbs. On the basis of percentage of tail length into head-body length the lowest figure, 59.9 per cent, occurs in a juvenile specimen, and the highest, 122.6 per cent, in an adult female. This proves that the growth rate of the tail is more rapid than that of

the head and body. In adult females the tail is generally longer than the head-body length.

The following computations were made by the junior author on fifty adult Ohio specimens (Cincinnati Soc. Nat. Hist. no. 1270, from Eden Park, Cincinnati) selected at random from several collections made on the same day. In this series of fifty there were 21 *P. richmondi* and 29 *P. cinereus*.

Extension of Vomerine Series

	<i>richmondi</i>	<i>cinereus</i>
Vomerines to inner edge of nares	_____ per cent	20.68 per cent
Vomerines to middle of nares	_____ " "	58.62 " "
Vomerines to outer edge of nares	33.33 " "	20.68 " "
Vomerines to beyond nares	66.66 " "	_____ " "

Intercostal spaces between Appressed Toes

	<i>richmondi</i>	<i>cinereus</i>
Range	10-14	6-11
Average	11.80	8.48

Total length

(specimens with regenerated tails included)

	<i>richmondi</i>	<i>cinereus</i>
Range	72-130 mm.	74-108 mm.
Average	105 mm.	81 mm.

Head-body length

	<i>richmondi</i>	<i>cinereus</i>
Range	41-64 mm.	32-56 mm.
Average	53.33 mm.	47.00 mm.

Habitat: In both West Virginia and Ohio, *Plethodon richmondi* exhibits a marked preference for the slopes of valleys and ravines, never occurring on the hilltops, and only rarely on the valley floors. In the regions of Athens, Huntington, and Oglebay Park, it is the dominant *Plethodon*.

More detailed studies of the habitat, behavior, and general ecology will be published subsequently.

Relationships: Specimens from Watauga County, North Carolina, and certain other localities outside the range of *richmondi* as here defined, bear a remarkable resemblance to this form although they display variations which do not fall within the normal limits of this species. These specimens may be tentatively referred to *richmondi* until the collection of material from intervening areas makes possible a thorough study of the problem.

The relationships of *richmondi* are by no means clear. There are three previously described slender species of the genus *Plethodon* in eastern North America; namely, *cinereus*, *dorsalis*, and *welleri*. Of these *cinereus* has the highest costal groove count (published range 17-21, but 18-20 in specimens counted by us) and it most closely approaches *richmondi* in total length. However, in dorsal and ventral coloration *richmondi* is most similar to *welleri*. Revolutionary as it may seem, we are forced to consider *richmondi*, which has the highest costal groove count, and the greatest number of costal folds between toes, most closely allied to *welleri*, which has the lowest costal groove count, and the lowest number of costal folds between toes, of any of the slender eastern *Plethodons*. As we have shown above, in its development the legs of *richmondi* grow at a rate much slower than the rate of lengthening of the body, and the body growth rate is slower than the rate of increase in tail length. If *welleri* lived in an environment which permitted it to reach the maximum size of *richmondi*, similar differential growth rates might result in the production of a salamander closely similar to *richmondi*. It is apparent that in each of the slender *Plethodons*, at least, the number of costal folds between the appressed toes increases with size. It is improbable that the number of costal grooves changes during the development of an individual salamander, but it is conceivable that certain environments may exert a selective influence which favors short or long-bodied hatchlings. Consequently, we feel that the similarities in coloration are a better indication of relationship in this instance than are structural features which vary with age, and possibly with environment. It is our present opinion, therefore, that *welleri* is a dwarfed, montane derivative from a widespread *richmondi* or pre-*richmondi* stock.

Acknowledgments: The senior author is indebted to Mr. Neil D. Richmond and to Mr. N. Bayard Green for their constant interest in this study and for their donation of living and preserved specimens from Huntington, West Virginia.

The junior author especially wishes to express his gratitude to Dr. Herschel T. Gier, of the Ohio University Zoology Department, for his aid in the field, as well as for his tireless efforts in the laboratory, and his helpful criticisms and suggestions in the preparation of the manuscript; also to Mr. Ralph Dury, Director of the Cincinnati Society of Natural History, for his generous loan of specimens.

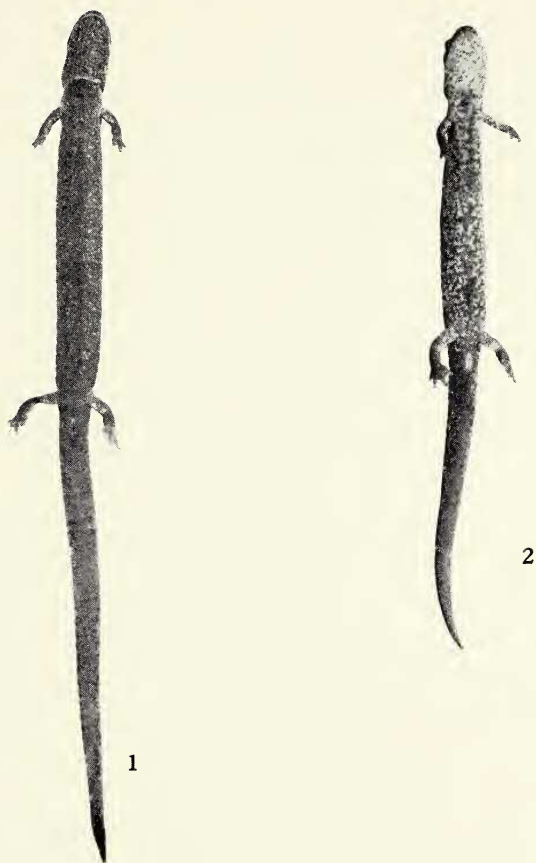


FIG. 1. *Plethodon richmondi* Netting and Mittleman. Paratype. Ventral view of adult female, Carnegie Museum no. 5294, Oglebay Park, Wheeling, W. Va. Natural size.

FIG. 2. *Plethodon cinereus* (Green). Ventral view of adult female, Carnegie Museum no. 4878, Ann Arbor, Michigan. Natural size.